Code No: **R201209** **R20** **SET - 1**

I B. Tech II Semester Supplementary Examinations, Jan/Feb-2024

ELECTRICAL CIRCUIT ANALYSIS –I

(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

Answer any five Questions one Question from Each Unit
All Questions Carry Equal Marks

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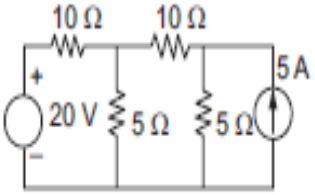
UNIT-I

1. a) Explain the following with respect to necessary examples: [7M]
i) Independent Voltage Source ii) Dependent Voltage source
iii) Linear and Non – Linear Elements

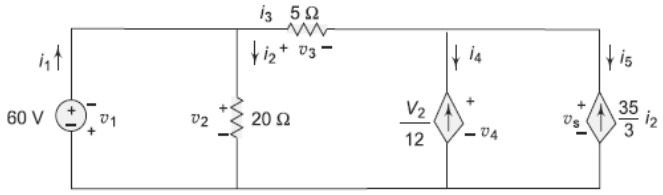
b) Find the power delivered by the voltage and current sources in the following circuit: [7M]



(OR)

2. a) Explain the steps involved in delta to star transformation as a network reduction technique. [7M]

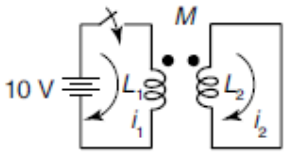
b) For the following circuit, find the voltages and currents. [7M]



UNIT-II

3. a) Explain the concept of Mutual inductance and give the significance of Dot convention in magnetic circuits. [7M]

b) For the circuit shown below, if L_1 = 2H, L_2 = 4H, M = 1.2H. Find the expression for the energy stored ‘t’ seconds after the switch is closed. [7M]



(OR)

4. a) Prove that when two coils of self-inductances L_1 and L_2 are connected in parallel opposing connection with a mutual inductance M then the total inductance is equal to $L_{eqv} = \frac{L_1L_2 - M^2}{L_1 + L_2 + 2M}$ [7M]

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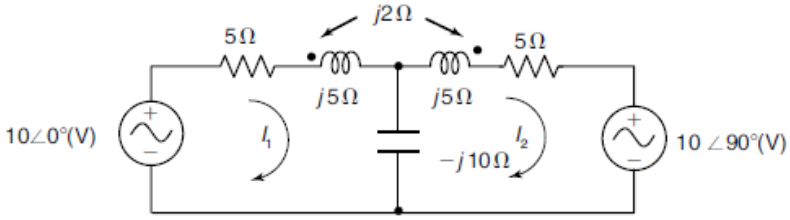
b) Find the voltage across the capacitor for the following circuit: [7M]



UNIT-III

5. a) Explain the following terms relating to Alternating quantity: [7M]
i) Amplitude ii) Instantaneous value iii) Time period iv) Frequency
v)Phase angle vi) phase difference vii) Root mean square value

b) A circuit containing a (i) resistance of 20 Ω alone (ii) inductance of 10 mH alone and (c) capacitance of 300 μF alone is connected across an alternating voltage source; write the expressions for the current when v = 100 sin 100 πt. [7M]

(OR)

6. a) Prove that in a purely inductive circuit the active power over a complete cycle is Zero. [7M]

b) A voltage of 400 V is applied to a series circuit containing a resistor, an inductor and a capacitor. The respective voltages across the components are 250 V, 200 V and180 V and the current is 5 A. Determine the phase angle of the current. [7M]

UNIT-IV

7. a) List and explain the properties of Series Resonant circuits [7M]

b) A series RLC circuit has R = 10 ΩL = 0.1 H and C = 8 μF. Determine (i) The resonant frequency (ii) Q factor of the circuit at resonance (iii) Half power frequencies. [7M]

(OR)

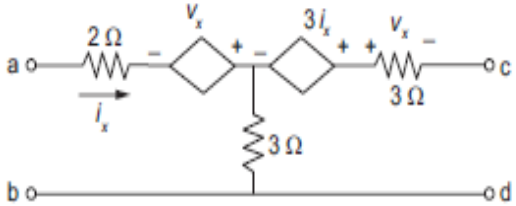
8. a) Explain the effect of variation of current and voltage across Inductor and capacitor with respect to frequency in a parallel resonance circuit. [7M]

b) Draw and explain the locus diagram for a series R – L circuit when R is variable and fixed inductive reactance. [7M]

UNIT-V

9. a) State and explain Norton's theorem. [7M]

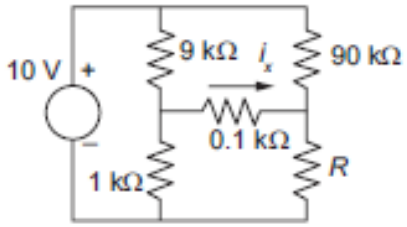
b) Check whether the reciprocity theorem is valid for the following circuit or not. Comment up on the result. [7M]



(OR)

10. a) State and explain Millman's theorem. [4M]

b) i)Find the value of R in the circuit shown below, if i_x is to be zero and ii) If i_x was seen to be 0.01mA, find the value of R by using compensation theorem. [10M]



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